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- (b) means for determining the electrical response value of each chemo/electro-active material upon exposure of the array to the gas mixture;
- 5 (c) means for determining a value for the temperature of the gas mixture connected in parallel with the chemo/elctro-active materials; and
- 10 (d) means for digitizing the electrical responses and the temperature value, and calculating a value from the digitized electrical response and temperature value, to perform an analysis of the individual gas component.

15 53. An apparatus according to Claim 52 wherein the array is situated within the gas mixture, which has a temperature of about 400°C or more.

54. An apparatus according to Claim 52 wherein the gas mixture is an emission from a combustion process.

20 55. An apparatus according to Claim 52 wherein the component gases in the gas mixture are not separated.

56. An apparatus according to Claim 52 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable  
25 temperature of the gas mixture.

57. An apparatus according to Claim 52 wherein the analysis is performed from the electrical responses of the chemo/electro-active materials upon exposure to the multi-component gas mixture only.

30 58. An apparatus according to Claim 52 wherein the means for performing analysis is means for calculating the concentration within the gas mixture of the individual gas component.

59. An apparatus according to Claim 52 wherein at  
35 least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about  $10^5$  ohm-cm, and (ii) exhibits a change in

electrical resistance of at least about 0.1 percent upon exposure of the material to an individual gas component, as compared to the resistance before exposure.

5        60. An apparatus according to Claim 52 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

61. An apparatus according to Claim 52 wherein the  
10 array is situated within the gas mixture, which has a temperature of less than about 400°C, and the array has a substantially constant temperature of about 400°C or more.

62. An apparatus according to Claim 52 wherein at  
15 least one chemo/electro-active material is a metal oxide.

63. In a multi-component gas mixture having a temperature of about 400°C or more, an apparatus for calculating the concentration of at least two  
20 individual analyte gas components in the mixture, comprising:

(a) an array of at least three chemo/electro-active materials connected in parallel circuitry, the array being situated within  
25 the gas mixture, and each chemo/electro-active material exhibiting a change in electrical resistance upon exposure to each of the individual analyte gas components, wherein at least one  
30 chemo/electro-active material, when at a temperature of about 400C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about  $10^5$  ohm-cm, and (ii) exhibits a change in electrical  
35 resistance of at least about 0.1 percent upon exposure of the material to an analyte gas component, as compared to the resistance before exposure;

- (b) means for determining the change in resistance of each chemo/electro-active material upon exposure of the array to the unseparated components of the gas mixture; and
- (c) means for calculating the concentration of each of the individual analyte gas components from the changes in resistance of the chemo/electro-active materials upon exposure to the multi-component gas mixture only.

64. An apparatus according to Claim 63 wherein the gas mixture is an emission from a combustion process.

65. An apparatus according to Claim 63 further comprising means for determining a value for the temperature of the gas mixture connected in parallel circuitry with the chemo/electro-active materials, and wherein the individual gas component is analyzed from digitized electrical responses and a digitized temperature value.

66. An apparatus according to Claim 63 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

67. An apparatus according to Claim 63 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an analyte gas component at the selected temperature for a period of at least about one minute.

68. An apparatus according to Claim 63 wherein at least one chemo/electro-active material is a metal oxide.